



STUDY OF EPISTAXIS REGARDING AETIOLOGY, MANAGEMENT AND OUTCOME WITH SPECIAL REFERENCE TO MANAGEMENT OF SPHENOPALATINE ARTERY

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ABSTRACT

Background: Epistaxis is one of the most common emergencies encountered in otorhinolaryngology practice. Although most cases are self-limiting, some patients require medical or surgical intervention for effective control of bleeding. Identification of the etiology and bleeding site is essential for appropriate management. In recent years, endoscopic techniques such as endoscopic sphenopalatine artery ligation (ESPAL) have emerged as effective treatment options for refractory posterior epistaxis.

Objective: To evaluate the clinical profile, etiology, and outcomes of different treatment modalities in patients presenting with epistaxis, with special reference to the role of the sphenopalatine artery in the management of refractory cases.

Materials and Methods: This prospective observational study was conducted in the Department of Otorhinolaryngology at Medical College and Hospital, Kolkata, from January 2014 to June 2015. A total of 84 patients presenting with active epistaxis were included after applying inclusion and exclusion criteria. Detailed clinical evaluation, nasal examination, and diagnostic nasal endoscopy were performed. Relevant hematological and radiological investigations were carried out where indicated. Patients were managed according to the severity and source of bleeding using conservative methods, nasal packing, electro-cautery, endoscopic sphenopalatine artery ligation, or other surgical procedures. Patients were followed up for 12 weeks to assess treatment outcomes.

Results: The majority of patients were males (73.8%) with a male-to-female ratio of 2.81:1. The most commonly affected age group was 31–50 years. The anterior nasal septum was the most frequent bleeding site (35.7%). Idiopathic epistaxis accounted for the largest proportion of cases (44.1%), followed by hypertension (21.4%) and trauma (11.9%). Nasal packing was the most commonly used treatment modality. Anterior nasal packing showed a success rate of 89.1%, while posterior nasal packing had a higher recurrence rate. Endoscopic sphenopalatine artery ligation performed in refractory posterior epistaxis demonstrated a success rate of 92.85%.

Conclusion: Most cases of epistaxis can be effectively managed with conservative measures and nasal packing. However, endoscopic sphenopalatine artery ligation is a safe and highly effective procedure for the management of intractable posterior epistaxis.

Keywords: Epistaxis, Sphenopalatine Artery, Endoscopic Sphenopalatine Artery Ligation, Nasal Packing, Posterior Epistaxis, Etiology of Epistaxis.

INTRODUCTION

Epistaxis, commonly known as nasal bleeding, is one of the most frequent emergencies encountered in otorhinolaryngology practice. It affects individuals of all age groups and accounts for a significant proportion of visits to emergency departments and ENT outpatient clinics. Although the majority of episodes are self-limiting and minor



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in nature, a small proportion of cases may become severe and require medical or surgical intervention. It has been estimated that approximately 7–14% of the adult population experience at least one episode of epistaxis during their lifetime, and about 6–10% of these cases require medical attention.¹

The etiology of epistaxis is multifactorial and can be broadly classified into local and systemic causes. Local causes include trauma, infection, inflammatory conditions, structural abnormalities such as deviated nasal septum or septal spur, and benign or malignant tumors of the nasal cavity and paranasal sinuses. Systemic causes include hypertension, bleeding disorders, vascular diseases such as hereditary haemorrhagic telangiectasia, and the use of anticoagulant medications. However, despite thorough clinical evaluation and investigations, a significant number of cases remain idiopathic.²

From an anatomical perspective, the nasal cavity has a rich vascular supply derived from both the internal and external carotid arterial systems. The most common site of bleeding is the anterior nasal septum, particularly the Kiesselbach's plexus located in Little's area, which is responsible for the majority of anterior epistaxis cases. Posterior epistaxis, although less common, tends to be more severe and difficult to control. It usually arises from branches of the sphenopalatine artery or Woodruff's plexus and often requires more aggressive management.³

The management of epistaxis depends on the severity, site of bleeding, and underlying etiology. Initial treatment usually includes conservative measures such as local pressure, topical vasoconstrictors, and anterior nasal packing. Posterior nasal packing may be required in cases of posterior epistaxis. Although nasal packing is effective in controlling bleeding in many cases, it is associated with patient discomfort, prolonged hospital stay, and a relatively high rate of recurrence.⁴

With the advancement of endoscopic techniques, surgical management of refractory epistaxis has evolved significantly. Traditionally, procedures such as internal maxillary artery ligation or external carotid artery ligation were performed for uncontrolled posterior epistaxis, but these procedures were associated with higher morbidity and complications. In recent years, endoscopic sphenopalatine artery ligation (ESPAL) has emerged as a safe and effective technique for controlling intractable posterior epistaxis. This procedure directly targets the terminal branch of the maxillary artery and has demonstrated high success rates with minimal complications.⁵

Considering the clinical importance of epistaxis and the evolving role of endoscopic surgical techniques, the present study was conducted to evaluate the clinical profile, etiology, and outcomes of various

treatment modalities in patients presenting with epistaxis, with special emphasis on the role of the sphenopalatine artery in the management of refractory posterior epistaxis.

MATERIALS AND METHODS

Study Design and Setting

This prospective observational study was conducted in the Department of Otorhinolaryngology at Medical College and Hospital, Kolkata, a tertiary care teaching hospital. The study aimed to evaluate the etiology, clinical profile, and management outcomes of patients presenting with epistaxis, with special reference to the role of the sphenopalatine artery in refractory cases.

Study Period

The study was carried out over a period of eighteen months from January 2014 to June 2015.

Study Population

All patients presenting with active epistaxis to the Otorhinolaryngology outpatient department and emergency department during the study period were considered for inclusion. A total of 102 patients presented with epistaxis during this period. After applying the inclusion and exclusion criteria, 84 patients were included in the final study.

Inclusion Criteria

Patients presenting with active epistaxis to the ENT outpatient department or emergency department during the study period were included in the study.

Exclusion Criteria

The following patients were excluded from the study:

- Patients with known coagulation disorders or those diagnosed with coagulopathies during investigation
- Patients receiving anticoagulant therapy
- Female patients during their menstrual cycle
- Patients with a previous history of sinonasal surgery or previously diagnosed sinonasal malignancy.

Data Collection and Clinical Evaluation

A detailed clinical history was obtained from each patient using a structured proforma. Particular attention was given to the duration of bleeding, frequency of episodes, laterality of bleeding, history of trauma, hypertension, diabetes mellitus, bleeding disorders, drug history including anticoagulant therapy, and previous episodes of epistaxis. Personal habits, allergy history, and relevant family history were also recorded.

After taking proper consent, a thorough general physical examination was performed, including assessment of vital signs such as pulse rate and blood pressure. Signs of pallor, cyanosis, icterus, clubbing, edema, and lymphadenopathy were noted. Systemic examination of the cardiovascular, respiratory, gastrointestinal, and nervous systems was also performed to identify any associated systemic disease.

Nasal Examination

Local examination of the nose was performed in all patients. The external nasal pyramid was inspected for any signs of trauma or deformity. Anterior rhinoscopy was carried out to examine the nasal septum, floor of the nasal cavity, inferior and middle turbinate's, and lateral nasal wall. The side and possible site of bleeding, presence of blood clots, crusts, septal deviation, septal spur, mucosal congestion, ulceration, polyps, or any mass lesion were documented.

Posterior rhinoscopy was performed whenever feasible to evaluate the nasopharynx, posterior ends of the turbinates, and posterior nasal septum to identify any bleeding point or mass lesion.

Nasal Endoscopy

Diagnostic nasal endoscopy was performed in all patients after the cessation of active bleeding. In patients who required nasal packing, endoscopy was carried out after removal of the nasal pack in the operating theatre. Rigid nasal endoscopes with 0°, 30°, and 45° angles were used (4 mm for adults and 2.7 mm for children). Endoscopy was performed under local anesthesia in adults and under general anesthesia in children when required.

The nasal cavity was systematically examined to identify the site of bleeding, presence of blood clots or crusts, mucosal abnormalities, septal deviation or spur, inflammatory polyps, foreign bodies, telangiectatic lesions, or any mass in the nasal cavity or nasopharynx. Endoscopy-guided biopsy was performed in cases with suspected neoplastic lesions.

Investigations

All patients underwent routine hematological investigations including complete blood count, bleeding time, clotting time, prothrombin time, international normalized ratio (INR), activated partial thromboplastin time (APTT), blood urea, serum creatinine, and blood glucose levels. Additional investigations such as liver function tests, chest radiography, and electrocardiography were performed when indicated.

Radiological investigations were performed based on clinical suspicion. These included X-ray of the nose and paranasal sinuses (occipitontal view), X-ray of the nasopharynx (lateral view), and computed tomography (CT) scan of the nose and paranasal sinuses in cases where sinonasal

pathology, fractures, or mass lesions were suspected.

Treatment Protocol

The initial management priority was to control active bleeding. Conservative measures such as anterior nasal packing were used as the first-line treatment. Posterior nasal packing was performed in cases where anterior packing failed to control the bleeding or when posterior epistaxis was suspected. Patients were categorized into two groups based on treatment outcome:

1. **Success group (No Bleed):** Patients in whom bleeding stopped after nasal packing without recurrence.
2. **Failure group (Bleed):** Patients who continued to bleed despite nasal packing, had persistent bleeding during pack removal after 48 hours, or developed rebleeding within seven days after pack removal.

Patients with anterior bleeding in the failure group were treated with endoscopic electro-cauterization of the bleeding vessel. Patients with posterior epistaxis underwent endoscopic sphenopalatine artery ligation (ESPAL) using clip, cauterization, or both techniques. In cases where ESPAL failed to control bleeding, external carotid artery ligation was performed.

Patients with identified local causes of epistaxis underwent appropriate definitive treatment such as septoplasty, spurectomy, functional endoscopic sinus surgery (FESS), excision of vascular lesions, reduction of nasal bone fractures, or oncological management in cases of suspected malignancy.

Follow-up

All patients were followed up at 1 week, 4 weeks, and 12 weeks after treatment. Clinical evaluation and nasal endoscopy were performed during follow-up visits to assess recurrence of bleeding and any complications related to treatment.

Ethical clearance: Approval of Institutional Ethics committee had been taken. Conflict of interest none declared

Statistical Analysis

The collected data were compiled and analyzed using descriptive statistical methods. Results were expressed in terms of frequencies, percentages, and proportions, and presented in the form of tables and figures.

Table 1: Age and Sex Distribution

Age Group (years)	Male	Female	Total	Percentage
0–10	3	1	4	4.8
11–20	6	2	8	9.5
21–30	9	3	12	14.3
31–40	10	3	13	15.5
41–50	14	5	19	22.6
51–60	12	4	16	19
>60	8	4	12	14.3
Total	62	22	84	100

Table 2: Seasonal Distribution

Season	Number of Cases	Percentage
January – March	20	39.20%
April – June	13	25.50%
July – September	8	15.70%
October – December	10	19.60%
Total	84	100

Table 3: Site of Bleeding

Site of Epistaxis	Cases	Percentage
Anterior septum	30	35.70%
Posterolateral wall	21	25%
Vestibule	4	4.70%
Posterior septum	4	4.70%
Polyps	5	5.90%
Sinonasal mass	2	2.30%
Septal hemangioma	1	1.20%
Nasopharyngeal mass	1	1.20%
Unidentified	16	19%

Table 4: Etiology of Epistaxis

Etiology	Cases	Percentage
Idiopathic	37	44.10%
Hypertension	18	21.40%
Trauma	10	11.90%
Deviated nasal septum	6	7.10%
Septal spur	3	3.60%
CRS with polyposis	3	3.60%
CRS without polyposis	5	5.90%
Antro choanal polyp	2	2.40%
Tumors	3	3.60%

Table 5: Outcome of Nasal Packing

Treatment	Cases	Success	Failure
Anterior nasal pack	46	41 (89.1%)	5 (10.9%)
Posterior nasal pack	19	10 (53.6%)	9 (47.4%)

Table 6: Surgical Treatment Outcome

Procedure	Cases	Success	Failure
Electro-cautery	3	3 (100%)	0
ESPAL	14	13 (92.85%)	1
External carotid ligation	1	1 (100%)	0

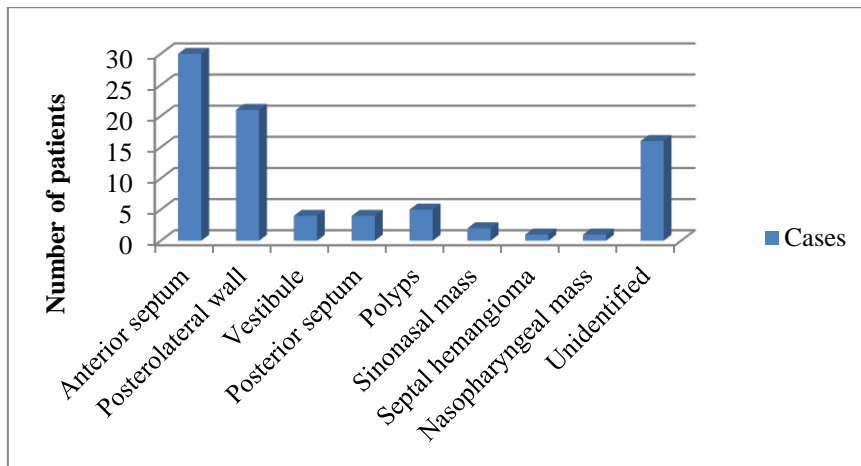


Figure 1: Site of Bleeding

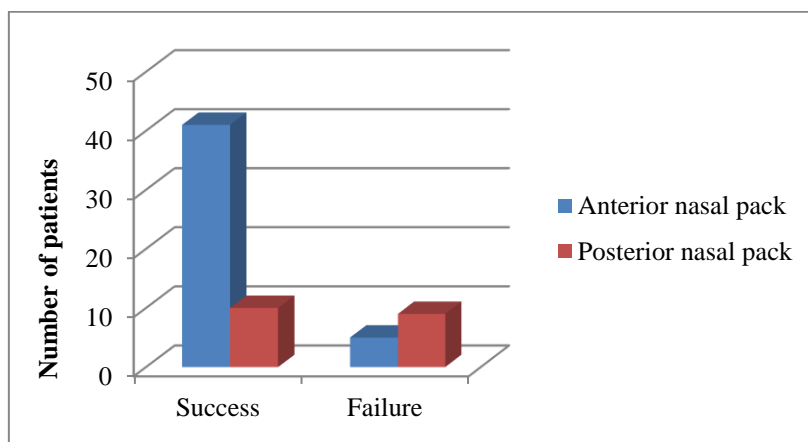


Figure 2: Outcome of Nasal Packing

RESULTS

A total of 102 patients presented with active epistaxis to the Department of Otorhinolaryngology, Medical College and Hospital, Kolkata during the study period from January 2014 to June 2015. After applying the predefined inclusion and exclusion criteria, 84 patients were included in the final analysis.

Demographic Profile

The highest number of patients belonged to the 41–50 years age group with 19 patients (22.6%), including 14 males and 5 females. This was followed by the 51–60 years age group with 16 patients (19%), consisting of 12 males and 4 females. The 31–40 years age group accounted for 13 patients (15.5%), including 10 males and 3 females, while the 21–30 years age group had 12 patients (14.3%), with 9 males and 3 females. Patients aged more than 60 years constituted 12 cases (14.3%), including 8 males and 4 females. The 11–20 years age group included 8 patients (9.5%), with 6 males and 2 females, whereas the 0–10 years age group had the lowest number of cases with 4 patients (4.8%), including 3 males and 1 female, showing a clear male predominance with a male-to-female ratio of 2.81:1. The age of the patients ranged from 5 to 80 years. The majority of patients belonged to the 31–

50 years age group, which accounted for the highest proportion of cases.

Seasonal Distribution

Seasonal analysis revealed that epistaxis occurred more frequently during the winter months. The highest number of cases was observed between January and March, accounting for 20 cases (39.2%). This was followed by April to June with 13 cases (25.5%), October to December with 10 cases (19.6%), and July to September with 8 cases (15.7%).

Laterality of Epistaxis

With regard to laterality, epistaxis was almost equally distributed between both nasal cavities. Right-sided bleeding was observed in 39 patients (46.43%), while left-sided bleeding was noted in 37 patients (44.1%). Bilateral bleeding occurred in 8 patients (9.52%).

Site of Bleeding

Clinical examination and nasal endoscopy revealed that the most common site of bleeding was the anterior part of the nasal septum, accounting for 30 cases (35.71%). The posterolateral wall of the nasal cavity was the second most common site, observed in 21 cases (25%). Other sites included the nasal vestibule in 4 cases (4.76%) and the posterior part of the nasal septum in 4 cases (4.76%).

Bleeding from associated pathological lesions was also noted. Congested nasal polyps were responsible for bleeding in 5 cases (5.95%), while sinonasal mass lesions were seen in 2 cases (2.38%). Septal hemangioma and nasopharyngeal mass were observed in one case (1.19%) each. However, in 16 cases (19.05%), the exact site of bleeding could not be identified.

Etiology of Epistaxis

The etiology of epistaxis could not be identified in a significant proportion of cases. Idiopathic epistaxis accounted for the majority of cases, seen in 37 patients (44.1%). Among identifiable causes, hypertension was the most common associated factor, present in 18 patients (21.4%). Trauma was responsible for 10 cases (11.9%). Other causes included deviated nasal septum in 6 patients (7.1%), septal spur in 3 patients (3.6%), chronic rhinosinusitis with polyposis in 3 patients (3.6%), and chronic rhinosinusitis without polyposis in 5 patients (5.9%). Antrochoanal polyp was found in 2 cases (2.4%), while septal hemangioma, nasopharyngeal carcinoma, and sinonasal malignancy were observed in 1 case (1.2%), 1 case (1.2%), and 2 cases (2.4%), respectively.

Treatment Modalities

Spontaneous cessation of bleeding was observed in 19 patients (22.6%). The majority of these cases were associated with trauma. Among the remaining 65 patients (77.4%), anterior nasal packing was used as the initial management modality. Out of these, 46 patients (54.76%) required only anterior nasal packing, while 19 patients (22.62%) required both anterior and posterior nasal packing.

Outcome of Nasal Packing

Among patients treated with anterior nasal packing, 41 patients (89.13%) achieved successful control of bleeding without recurrence, while 5 patients (10.87%) experienced rebleeding.

In contrast, patients who required posterior nasal packing had a higher rate of recurrence. Among the 19 patients, 10 patients (53.63%) had successful control of bleeding, whereas 9 patients (47.37%) developed rebleeding.

Surgical Management and Outcome

Among the 17 patients who experienced failure of nasal packing, 3 patients with anterior bleeding underwent endoscopic electro-cauterization, which achieved 100% success.

The remaining 14 patients with posterior epistaxis underwent endoscopic sphenopalatine artery ligation (ESPAL). Successful control of bleeding was achieved in 13 patients (92.85%), while 1 patient (7.14%) had recurrent bleeding after ESPAL. This patient subsequently underwent external carotid artery ligation, which successfully controlled the bleeding.

Among the ESPAL procedures performed, only cautery was used in 2 patients, clipping alone in 3 patients, and both clipping and cautery in 9 patients.

Recurrence occurred in one patient who had undergone only cautery.

DISCUSSION

Epistaxis is one of the most common emergencies encountered in otorhinolaryngology practice. The present prospective study evaluated the clinical profile, etiology, and outcome of various treatment modalities of epistaxis with special emphasis on the role of the sphenopalatine artery in refractory cases.

Demographic Profile

In the present study, the majority of patients were males (73.8%) with a male-to-female ratio of 2.81:1. Similar male predominance has been reported in several previous studies. Saurav Varshney and colleagues reported a higher incidence of epistaxis in males compared to females in their retrospective study.⁶ Likewise, S. Chaiyasate et al. reported that 74.5% of epistaxis cases occurred in males.⁷ Male predominance may be explained by greater exposure to trauma, environmental factors, and occupational hazards. In addition, hormonal influences may provide some protection in premenopausal females. The age distribution in the present study showed that the most affected age group was 31–50 years, which is comparable to the findings reported by Sohit Paul and colleagues, who observed that the majority of patients with epistaxis belonged to the 21–60 years age group⁸. These findings indicate that epistaxis commonly affects individuals in the active working age group.

Seasonal Variation

In the present study, the highest incidence of epistaxis was observed between January and March, accounting for 39.2% of cases. Similar seasonal patterns have been reported in previous studies. Urvasi Razdan et al. reported a higher incidence of epistaxis during winter months.⁹ Cold and dry weather conditions during winter may lead to drying and crusting of the nasal mucosa, which predisposes to rupture of superficial blood vessels.

Site of Bleeding

Identification of the bleeding site is important for effective management of epistaxis. In the present study, the anterior part of the nasal septum was the most common site of bleeding (35.7%). This region corresponds to Kiesselbach's plexus, which is known to be the most common source of anterior epistaxis. Another study by Pramod Adhikari also reported that the majority of epistaxis cases arise from Little's area.¹⁰

Posterior epistaxis in our study accounted for a significant proportion of cases originating from the posterolateral wall of the nasal cavity. Posterior epistaxis is generally more severe and difficult to control due to involvement of larger arteries such as the sphenopalatine artery.

Etiology of Epistaxis

In the present study, the etiology of epistaxis could not be determined in 44.1% of cases, which were

classified as idiopathic. This finding is consistent with previous studies. Philip M. Stell reported that up to 70–80% of epistaxis cases may be idiopathic¹¹ Similarly, Nicholas P. Christensen et al. reported idiopathic causes in approximately 61% of cases.¹² Among the identifiable causes, hypertension was the most common associated factor (21.4%) in our study. Hypertension may contribute to epistaxis by causing degenerative changes in the vascular walls, making them more susceptible to rupture.

Trauma was the second most common cause in our study (11.9%). Trauma may occur due to nasal injury, nose picking, or accidental injury. However, some studies such as that by Jophet M. Gilyoma reported trauma as the most common cause of epistaxis.¹³ Differences in etiology among studies may reflect variations in patient population and referral patterns.

Treatment Modalities and Outcome

Most cases of epistaxis can be managed conservatively. In the present study, spontaneous cessation of bleeding occurred in 22.6% of cases. Nasal packing remained the most commonly used initial management technique, accounting for 77.4% of patients.

Anterior nasal packing successfully controlled bleeding in 89.1% of cases, whereas posterior nasal packing had a higher failure rate, with rebleeding observed in 47.37% of cases. Similar findings have been reported by S. E. Stangerup, who noted rebleeding rates of up to 40% with posterior nasal packing.¹⁴

Among patients with persistent epistaxis after nasal packing, endoscopic electro-cauterization was performed for anterior bleeding and achieved a 100% success rate. Gareth W. McGarry also reported high success rates with endoscopic cauterization for anterior epistaxis.¹⁵

Posterior epistaxis cases were treated with endoscopic sphenopalatine artery ligation (ESPAL). In our study, ESPAL achieved a success rate of 92.85%, which is comparable to previous studies. Peter-John Wormald reported success rates of approximately 92% for ESPAL.¹⁶ Similarly, Luke Rudmik reported success rates close to 89% in the management of intractable posterior epistaxis.¹⁷

The single case of recurrence following ESPAL in our study was successfully managed with external carotid artery ligation. Previous studies have suggested that external carotid artery ligation is an effective option for controlling persistent epistaxis when other surgical interventions fail.¹⁸

Overall, the findings of this study support the growing evidence that endoscopic sphenopalatine artery ligation is a safe, effective, and minimally invasive procedure for the management of refractory posterior epistaxis.

CONCLUSION

The present study highlights important clinical aspects of epistaxis in patients presenting to a tertiary care hospital. Epistaxis was found to occur more frequently in adult males, with the highest incidence in the 31–50-year age group. A seasonal variation was observed, with the majority of cases presenting during the winter months between January and March. The most common site of bleeding was the anterior nasal septum, corresponding to Kiesselbach's plexus. Idiopathic epistaxis constituted the largest proportion of cases, while hypertension and trauma were the most common identifiable risk factors. Initial management with nasal packing was effective in the majority of patients; however, posterior nasal packing showed a higher rate of recurrence. Endoscopic electro-cauterization proved to be highly effective in cases of anterior epistaxis. For patients with refractory posterior epistaxis, endoscopic sphenopalatine artery ligation demonstrated a high success rate with minimal complications. In rare cases where ESPAL failed, external carotid artery ligation was an effective salvage procedure. Thus, ESPAL represents a safe and reliable surgical option for the management of intractable posterior epistaxis, and its use may reduce the need for more invasive procedures. Further studies with larger sample sizes are recommended to better evaluate the role of different treatment modalities and to strengthen the evidence regarding optimal management strategies for epistaxis.

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